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09/455,408	12/06/1999	SYLVAIN SARDA	612.37806X00	5076

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EXAMINER

DAY, HERNG DER

ART UNIT	PAPER NUMBER
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2128

DATE MAILED: 03/10/2004

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Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

09/455,408

Applicant(s)SARDA, SYLVAIN **Examiner**

Herng-der Day

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 December 2003 and 22 January 2004.
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 7-12 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 7-12 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This communication is in response to Applicant's Amendment (paper # 16) to Office Action dated August 25, 2003 (paper # 11), mailed December 24, 2003.

1-1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.

1-2. Claims 7-12 are pending.

1-3. Claims 7-12 have been examined and rejected.

Declaration

2. The Declaration of Bernard Bourbiaux Pursuant to 37 CFR §1.132 (paper # 18) has been reviewed. The arguments are not persuasive because both of the referenced US patents, i.e., 6,023,656 and 6,064,944, have issue dates later than the filing date of this instant application.

Drawings

3. The objection to the drawings has been withdrawn.

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Specification

4. The objections to the specification in paper # 11 have been withdrawn. However, in the Substitute Specification (paper # 19), faxed March 3, 2004, all dots in all equations are not positioned properly. Appropriate correction is required.

Claim Objections

5. The objection to claim 7 has been withdrawn.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 7-12 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

7-1. For example, as described in lines 9-11, page 13 of the substitute specification, "The pore volumes of the fracture meshes and of the matrix blocks (ϕ_i) are known by means of the mesh pattern", however, the pore volumes calculation of the fracture meshes has not been disclosed in the specification. The porosity of fracture meshes has not been provided as input data.

Accordingly, it would require undue experimentation for one skilled in the art to make and/or use

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the invention when calculating the accumulation term (A_i) of the fracture mesh as shown in equations at page 14 of the substitute specification.

7-2. Claim 8 recites the limitation “the matrix volume associated with each fracture mesh in each layer of the porous medium contains all points which are closer to a corresponding node than to neighboring nodes”. Although it has mentioned in the “Summary Of The Invention” as described in lines 3-5, page 5 of the substitute specification, it provides no details of how to implement it. Accordingly, it would require undue experimentation for one skilled in the art to associate a matrix volume with each fracture mesh.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 9 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9-1. Claim 9 recites the limitation of defining “the matrix volume associated with each fracture mesh”. However, it fails to further limit the subject matter of claim 8 and destroys the limitation recited in claim 8 (closer to a corresponding **node** vs. to a closest **fracture mesh**). For the purpose of claim examination, the Examiner will presume that claim 9 is a dependent claim of claim 7. Claim 12 is rejected as being dependent on the rejected claim 9.

10. Claims 10 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted step is “determining a distance”.

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10-1. Claims 10 and 11 recite the limitation “determining at any point a transmissivity value for each pair of a fracture mesh and a matrix block”. However, as described in lines 4-6, page 9 of the substitute specification, “For each matrix block, the image processing algorithm also gives the distance from each pixel of the block to the associated fracture mesh. This data is used to calculate the transmissivity between the fracture mesh and the matrix block”. In other words, the distance data is used to calculate the transmissivity. Accordingly, claim 10 which depends on claim 7, and claim 11 which depends on claim 8, omit the essential step of “determining a distance” because the “distance” is determined in claim 9. For the purpose of claim examination, the Examiner will presume that both claims 10 and 11 are dependent claims of claim 9.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

12. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cacas et al., U.S. Patent 6,023,656 issued February 8, 2000, and filed December 30, 1997, in view of Noetinger et al., U.S. Patent 6,094,619 issued July 25, 2000, and filed July 2, 1998.

12-1. Regarding claims 7 and 8, Cacas et al. disclose a method for modelling fluid flows in a fractured multilayer porous medium to simulate interactions between pressure and flow rate variations in a well through the medium, comprising:

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(Claim 7) discretizing the fractured medium by a mesh pattern with fracture meshes centered on nodes at fracture intersections with each node being associated with a matrix volume (each node being placed at the middle of the intersection segments; and 3D volume studied, column 5, line 61 through column 6, line 11).

(Claim 8) the medium comprises fractured layers (fractured network in a subsurface multi-layered medium, column 2, lines 44-46).

the matrix volume associated with each fracture mesh in each layer of the porous medium contains all points which are closer to the corresponding node than to neighboring nodes (FIG. 5).

Cacas et al. fail to expressly disclose determining flows between each fracture mesh and the associated matrix volume in a pseudosteady state.

Noetinger et al. disclose a method for determining large-scale representative hydraulic parameters of a fractured medium comprises determination of the variation with time of a large-scale transfer function characterizing the fluid flow from the matrix to the fractures. The method can be applied for large-scale modeling of fractured oil reservoirs allowing well test interpretation (abstract).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Cacas et al. to incorporate the teachings of Noetinger et al. to obtain the invention as specified in claims 7 and 8 because Noetinger et al. suggest the method can be applied for large-scale modeling of fractured oil reservoirs allowing well test interpretation.

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13. Claims 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combined teachings of Cacas et al., U.S. Patent 6,023,656 issued February 8, 2000, and filed December 30, 1997, and Noetinger et al., U.S. Patent 6,094,619 issued July 25, 2000, and filed July 2, 1998, as applied to claim 7 above, and further in view of Sarda et al., U.S. Patent 6,064,944 issued May 16, 2000, and filed December 30, 1997.

13-1. Regarding claims 9-12, Cacas et al. fail to expressly disclose: (1) each fractured layer is discretized in pixels and the matrix volume associated with each fracture mesh is defined by determining a distance from each pixel to a closest fracture mesh; and (2) determining at any point a transmissivity value for each pair of a fracture mesh and a matrix block by considering that pressure varies linearly depending on a distance from a point being considered to the fracture mesh associated with the matrix block.

Sarda et al. disclose a method, based on a pixel representation of the medium, which determines the dimensions of equivalent blocks. With this method, many different transfer functions through any type of heterogeneous medium can be easily and rapidly computed (method, column 3, lines 44-47). The transfer function can represent variations between different parts of the geological medium, for example of distances or transmissivities or heat (function, column 3, lines 17-22). Specifically, Sarda et al. disclose the missing elements:

(Claim 9) each fractured layer is discretized in pixels (array of pixels, column 3, lines 31-32) and the matrix volume associated with each fracture mesh is defined by determining a distance from each pixel to a closest fracture mesh (distance, column 3, lines 33-43).

(Claims 10-12) determining at any point a transmissivity value for each pair of a fracture mesh and a matrix block by considering that pressure varies linearly depending on a distance

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from a point being considered to the fracture mesh associated with the matrix block (transmissivities, column 3, lines 17-22).

In order to model fluid flows in a fractured multiplayer porous medium, one of ordinary skill in the art would be motivated to solve problems of heterogeneous medium because it most likely exists in a multiplayer porous medium.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined teachings of Cacas et al. and Noetinger et al. to incorporate the teachings of Sarda et al. to obtain the invention as specified in claims 9-12 because with the teachings of Sarda et al. a number of different transfer functions, for example of distances or transmissivities, applied to any type of heterogeneous medium can be easily and rapidly computed (Sarda, column 3, lines 44-47).

Applicant's Arguments

14. Applicant argues the following:

(1) Regarding Mr. Bourbiaux's Declaration, "his Declaration infact demonstrates that a person of ordinary skill in the art, without undue experimentation, would be enabled to calculate volume without undue experimentation" (pages 1-2, paper # 17).

(2) "There is no disclosure in Cacas et al of determining flows between fracture meshes and the associated matrix volume in a pseudo-steady state" (page 12, paper # 16).

(3) "The nodes of Jones et al are non-analogous to the nodes of Cacas et al" and "if the proposed combination of Cacas et al and Jones et al were made, the subject matter of claim 7 would not be achieved" (page 14, paper # 16).

(4) "Sarda does not cure the deficiencies noted above with respect to claims 10 and 11" (page 15, paper # 16).

Response to Arguments

15. Applicant's arguments have been fully considered.

15-1. Applicant's argument (1) is not persuasive because both of the referenced US patents, i.e., 6,023,656 and 6,064,944, have issue dates later than the filing date of this instant application.

15-2. Applicant's arguments (2)-(4) are persuasive. Therefore, the rejections of claims 7-12 under 35 U.S.C. 103(a) in paper # 11 have been withdrawn. However, upon further consideration, a new ground(s) of rejection is made, as detailed in sections 11 to 13-1 above.

Conclusion

16. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Heng-der Day whose telephone number is (703) 305-5269. The Examiner can normally be reached on 9:00 - 17:30.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kevin J Teska can be reached on (703) 305-9704. The fax phone numbers for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Heng-der Day
March 8, 2004

*Thayphan
Thai Phan
Patent Examiner
AU: 2128*